Cum poſtea Mala ſive Pyra Cydonia permaturuiſſent, quaſdam etiam Mali Cydonij particulas ad Microſcopium applicavi ; & Lanuginem, quæ ex Malo Cydonio exhalatur, neque Lanugini Mali Perſici Copiâ cedit, delineandam curavi ; quæ omnia in Icone 4 deſignata vides per H I K L M N O. Ubi H I N O perparva eſt portio Mali Corticiſque Cydonij, per I K L M N Lanugo ex Malis Cydoniis exſudans indicatur. Quæ Lanugo, licet in Cydoniis longior quam in Perſicis, non tamen in illis erigitur, ſicut in iſtis ; ſed criſpando ſibi invicem implectitur.

X. *Remarks on ſome Attempts made towards a perpetual Motion, by the Reverend Dr.* Deſaguliers. *F. R. S.*

THE Wheel at *Heſſe-Caſſel*, made by Monſieur *Orfireus* and by him called a perpetual Motion, has of late been ſo much talk'd of, on Account of its wonderful *Phænomena*, that a great many People have believed it to be actually a ſelf-moving Engine ; and accordingly have attempted to imitate it as ſuch. Now as a great deal of Time and Money is ſpent in thoſe Endeavours, I was willing (for the Sake of thoſe that try Experiments with that View) to ſhew that the Principle, which moſt of them go upon is falſe, and can by no Means produce a perpetual Motion.

They take it for granted, that if a Weight deſcending in a Wheel, at a determinate Diſtance from the Centre, does in its Aſcent approach nearer to it ; ſuch a Weight

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a Weight in its Deſcent will always preponderate, and cauſe a Weignt equal to it to riſe, provided it comes nearer the Centre in its Riſe; and accordingly as it ſelf riſes, will be overbalanced by another Weight equal to it; and therefore they endeavour by various Contrivances to produce that Effect, as if the Conſequence of it would be a perpetual Motion.

But I ſhall ſhew, that they miſtake one particular Caſe of a general *Theorem*, or rather a *Corollary* of it, for the *Theorem* it ſelf. The *Theorem* is as follows:

Theor. If one Weight in its Deſcent, does by Means of any Contrivance, cauſe another Weight to aſcend with a leſs *Momentum* or Quantity of Motion than it ſelf, it will preponderate and raiſe the other Weight.

Cor. 1. Therefore if the Weights be equal, the deſcending Weight muſt have more Velocity than the aſcending Weight, becauſe the *Momentum* is made up of the Weight multiplied iuto the Quantity of Matter.

Cor. 2. Therefore if a Leaver or Balance, have equal Weights faſten'd or hanging at its Ends, and the *Brachia* be ever ſo little unequal, that Weight will preponderate, which is fartheſt from the Centre.

SCHOLIUM.

This Second *Corollary* cauſes the Miſtake; becauſe thoſe, who think the Velocity of the Weight is the Line it deſcribes, expect that that Weight ſhall be overpois'd, which deſcribes the ſhorteſt Line, and therefore contrive *Machines*, to cauſe the aſcending Weight to deſcribe a ſhorter Line than the deſcending Weight.

As for Example, in the Circle A D B a (*Fig. 5.*) the Weights A and B being ſuppoſed equal, they imagine, that if (by any Contrivance whatever) whilſt the Weight A deſcribes the *Arc* A a, the Weight B is carried in any *Arc*, as B b, ſo as to come nearer the Centre in its riſing, than if it went up the *Arc* B D; the ſaid Weight ſhall be overpois'd, and conſequently, by a Number of ſuch Weights, a perpetual Motion will be produced.

This is attempted by ſeveral Contrivances, which all depend upon this falſe Principle; but I ſhall only mention one, which is repreſented by *Fig. 6.* where a Wheel having two parallel Circumferences, has the Space between them divided into Cells, which being carv'd, will, (when the Wheel goes round) cauſe Weights plac'd looſe in the ſaid *Cells*, to deſcend on the Side A A A, at the outer Circumference of the Wheel; and on the Side D to aſcend in the Line B b b b, which comes nearer the Centre, aud touches the inner Circumference of the Wheel. In a *Machine* of this Kind, the Weights will indeed move in ſuch a Manner, if the Wheel be turn'd round, but will never be the Canſe of the Wheels going round. Such a *Machine* is mentioned by the Marquis of *Worceſter*, in his Century of Inventions in the following Words, N°. 56.

" To provide and make that all the Weights of the " deſcending Side of a Wheel, ſhall be perpetually " farther from the Centre, than thoſe of the mount- " ing Side, and yet equal in Number, and heft to " the one Side as the other. A moſt incredible thing, " if not ſeen; but tried before the late King (of bleſ- " ſed Memory) in the *Tower* by my Directions, two " extraordinary Ambaſſadors accompanying his Ma- " jeſty,

" jeſty, and the Duke of *Richmond*, and Duke of *Ha-*
" *milton*, with moſt of the Court attending him. The
" Wheel was fourteen Foot over, and had fourty Weights
" of fifty Pounds a Piece. Sir *William Balfore*, then
" Lieutenant of the *Tower*, can juſtify it, with
" ſeveral others. They all ſaw, that no ſooner theſe
" great Weights paſſed the Diameter Line of the lower
" Side, but they hung a Foot farther from the Centre;
" nor no ſooner paſſed the Diameter Line of the upper
" Side, but they hung a Foot nearer Be pleaſed to
" judge the Conſequence.

Now the Conſequence of this, and ſuch like *Machines*, is nothing leſs, than a perpetual Motion; and the Fallacy is this. The Velocity of any Weight is not the Line, which it deſcribes in General, but the Height that it riſes up to, or falls from, with reſpect to its Diſtance from the Centre of the Earth. So that when the Weight (*Fig.* 5.) deſcribes the *Arc* A a, its Velocity is the Line A C, which ſhews the perpendicular Deſcent (or meaſures how much it is come nearer to the Centre of the Earth) and likewiſe the Line B C denotes the Velocity of the Weight B, or the Height that it riſes to, when it aſcends in any of the *Arcs* B b, inſtead of the *Arc* B D: So that in this Caſe, whether the Weight B in its Aſcent be brought nearer the Centre or not, it loſes no Velocity, which it ought to do, in order to be rais'd up by the Weight A. Nay, the Weight in riſing nearer the Centre of a Wheel, may not only not loſe of its Velocity, but be made to gain Velocity, in Proportion to the Velocity of its counterpoiſing Weights, that deſcend in the Circumference of the oppoſite Side of the Wheel; for if we conſider two *Radij* of the Wheel, one of which is

Horizontal, and the other (faſten'd to and moving with it) inclin'd under the Horizon in an Angle of 60 degr. (*Fig.* 7.) and by the Deſcent of the End B of the *Radius* B C, the *Radius* C D by its Motion cauſes the Weight at D, to riſe up the Line p P, which is in a Plane that ſtops the ſaid Weight from riſing in the Curve D A, that Weight will gain Velocity, and in the Beginning of its Riſe, it will have twice the Velocity of the Weight at B; and conſequently, inſtead of being rais'd, will overpoiſe, if it be equal to the laſt mentioned Weight. And this Velocity will be ſo much the greater, in Proportion as the Angle A C D is greater, or as the Plane P p (along which the Weight D muſt riſe) is nearer to the Centre. Indeed if the Weight at B, Fig. 5. could by any Means be lifted up to β, and move in the *Arc* β b, the End would be anſwer'd; becauſe then the Velocity would be diminiſhed, and become β C.

Experiment (*Fig.* 7.)

Take the Leaver B C D, whoſe *Brachia* are equal in Length, bent in an Angle of 120 degr. at C, and moveable about that Point as its Centre: In this Caſe, a Weight of two Pounds hanging at the End B of the horizontal Part of the Leaver, will keep in *Æquilibrio* a Weight of Four Pounds hanging at the End D. But if a Weight of one Pound be laid upon the End D of the Leaver, ſo that in the Motion of D along the *Arc* p A, this Weight is made to riſe up againſt the Plane P p (which divides in half the Line A C equal to C B) the ſaid Weight will keep in *Æquilibrio* two Pounds at B, as having twice the Velocity of it, when the

the Leaver begins to move. This will be evident, if you let the Weight 4 hang at D, whilſt the Weight 1 lies above it: For if then you move the Leaver, the Weight 1 will riſe four times as faſt as the Weight 4.

XI. *A Method for rowing Men of War in a Calm. Communicated by Monſieur* Du Quet.

TO perfect the Art of Navigation, Two Things ſeem principally wanting; *viz.* An eaſy Method for finding the Longitude at Sea; and a Way to give a Veſſel its Courſe, when there's no Wind ſtirring.

I flatter my ſelf to have found the laſt; and hope to make it appear, by Reaſon and Experiment, That a Man of War may make a League an Hour in a Calm, by Means of revolving Oars, which are eaſily apply'd to the Sides of the Ship, without occaſioning any Incumbrance: As I ſhall make appear by the following Account, after having deliver'd my Notion of the Motion of Bodies in Fluids.

A Body ſwims upon Water, when it weighs leſs than the Volume of Water, whoſe Place it takes up; and it ſinks more or leſs in the Water, only in proportion as its Volume is more or leſs increas'd.

A Body lying in ſtill Water, is as it were *in Æquilibrio*; the leaſt Effort gives it Motion, and makes it loſe that *Æquilibrium*. If the Effort be continued, tho' ever ſo little, the Motion it communicates will be very

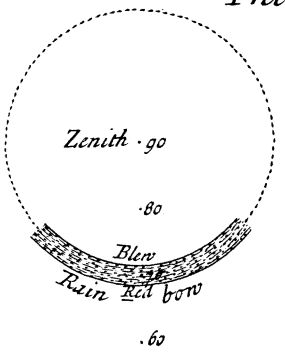

Fig. 1.

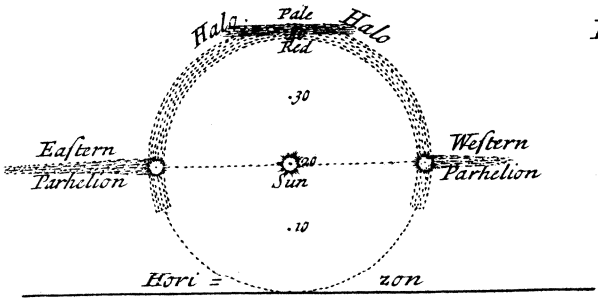

Fig. 2.

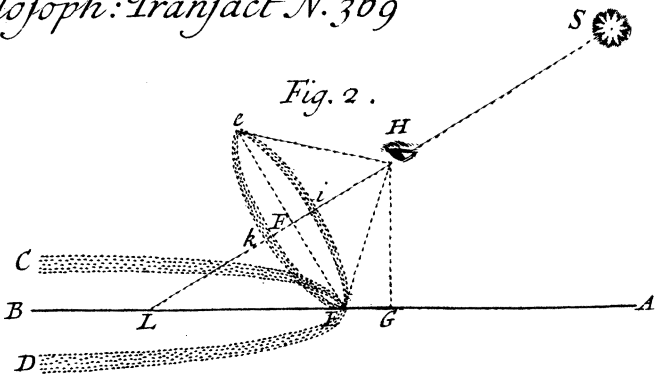

Fig. 5.

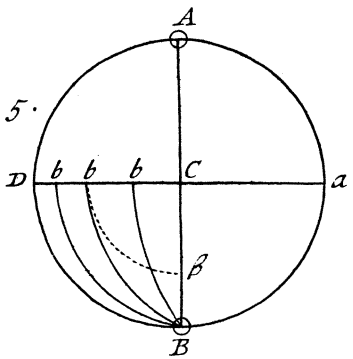

Fig. 6.

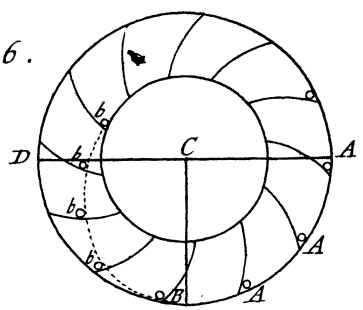

Fig. 7.

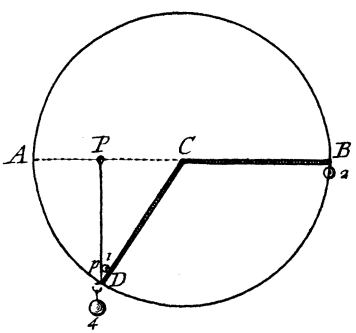

Fig. 3.

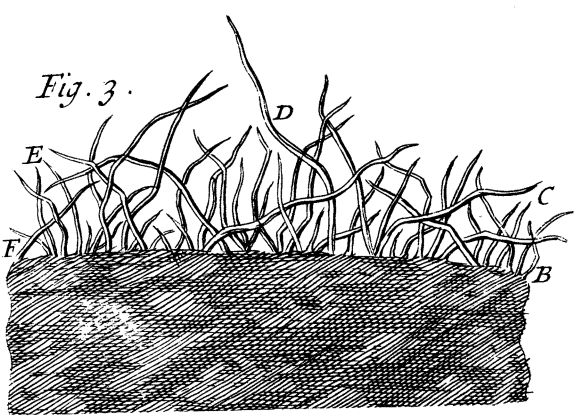
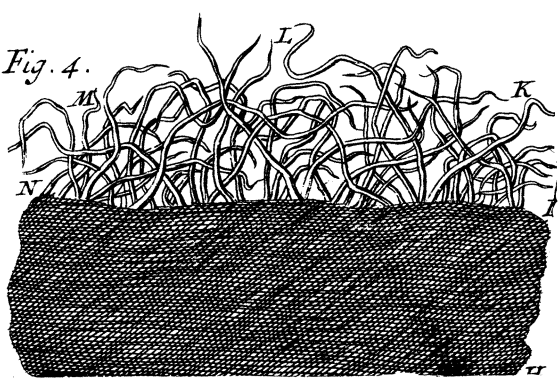
Fig. 4.